Microwave Engineering

Course Code: CT476

Students: Only for B. Tech. VII Semester, MTech and PhD students

Structure: 3-0-2-4

Faculty: Deepak K. Ghodgaonkar (deepak.ghodgaonkar@daiict.ac.in) (Extn. 623)

Pre-Requisite: Electromagnetic Theory (SC217)

Mechanisms/modalities for online delivery of Lectures: Lecture notes will be uploaded in Google Class Drive Folder on 20th August. These notes will be updated weekly. Before each lecture, all students will be alerted about the lecture 5 minutes before scheduled time by Google Meet. Audio and the screen share option of the Google Meet will be used to share the lectures with students. During lectures, important concepts will be presented by using figures, illustrations, tables and equations by pdf and ppt presentations. Also, graphic tablet will be used for writing on the screen to emphasize important points during lecture. Record of the lecture will be shared through Google Classroom. Students are encouraged to unmute microphone for asking questions. Also, students can send questions via posts on Google Classroom and e-mails.

Objectives:

The objectives of this course is to develop understanding of microwaves and RF technologies in areas such as TEM mode lines, waveguides, vacuum tube and solid state devices, MMIC technology, radiation hazards, microwave measurements and applications of microwaves.

Syllabus:

1. Design and analysis of TEM mode transmission lines such as open two-wire lines, coaxial line, stripline and microstripline.
3. Theory, design and analysis of rectangular and circular waveguides.
4. Rectangular and circular waveguide components such as couplers, waveguide couplings, waveguide junctions, impedance matching using irises, attenuators, resonators and phase shifters.
5. Operation and applications of microwave vacuum tube devices such as klystron, magnetron and traveling-wave tube (TWT) amplifiers.
6. Operation and applications microwave solid state devices such as Gunn diode oscillator, IMPATT diode amplifiers, bipolar transistors and MOSFET.
7. Introduction to MMIC (Monolithic Microwave Integrated Circuits) and MIC technologies.
8. Microwave Measurements with slotted lines, network analyzers, spectrum analyzers.
10. Applications of Microwaves such as radar, microwave oven, RF-ID
Course Outcome:

At the end of this course students will be able to design TEM mode lines and waveguides for microwave applications. Also, students will develop expertise in making measurements such as SWR, scattering parameters, antenna gain and radiation pattern at microwave frequencies. This course gives good knowledge of all aspects of microwave technology.

Suggested Texts and References:


Evaluation:

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mid-Sem. Exam.</td>
<td>35%</td>
</tr>
<tr>
<td>End-Sem. Exam.</td>
<td>35%</td>
</tr>
<tr>
<td>CST Microwave Studio Project</td>
<td>10%</td>
</tr>
<tr>
<td>Assignments</td>
<td>5%</td>
</tr>
<tr>
<td>Laboratory work with online experiments</td>
<td>7% Reports + 8% Viva</td>
</tr>
</tbody>
</table>